

PROJECT: *HERON*

Title

HERON

Low Energy Elastic Scattering Solar Neutrino Detection with superfluid He

Physics Goals

Elastic Scattering of Low Energy (pp, CNO, 7Be) Solar Neutrinos

θ_{12} determination, solar model (PP & CNO, 7Be confirmation) measurements, sterile neutrino tests, magnetic moment measurements,

Factor 2 or 3 improvement in θ_{12} determination, best potential limits for sterile neutrinos mixed θ_k : orthogonal MSW response to KamLAND

Features

20T superfluid He, cryogenic detector, scintillation and phonon detection of energy deposition, vertex resolution with coded aperture

Scintillation and phonon excitation detection of energy deposition, intrinsically ultralow internal backgrounds

Requires extensive external background modeling, deep underground site, large cryogenic engineering efforts

Best determined (most precise) neutrino source likely for decades

Technological Challenges (if any)

Backgrounds, Backgrounds, Backgrounds

Signal detection and scaling to full 20T

Cryogenic detector at depth

Monte Carlo simulations, vertex and event reconstruction with coded apertures

LBNL Contribution and Interest

*Hardware, Software: **cryogenic engineering, detector/signal readout, data analysis***

*Expected or necessary LBNL Manpower: **Physicists and engineering & technical staff***

*Divisions involved: **NSD (LDRD 2002/3)***

Status

Detection R&D in Superfluid He and Monte Carlo Simulations

Timeline

Timescale: R&D and Simulations for several years, followed by Prototype, and proposal preparation over the next 5 years. First measurements probably ~5 years from receipt of funding

Duration of Experiment: 5 to 10 years of ES, possible other measurements may require additional running time or configurations

Location

TBD: Homestake, most appropriate

Collaboration

Brown University (Lanou) + European Cryo groups

Funding Sources

DOE likely

Resources, Links, and References

*Websites <http://www.physics.brown.edu/research/cme/heron/>
SNOMASS, NeSS other presentations*

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